ELECTRICAL REQUIREMENTS FOR HEALTH CARE FACILITIES

Review Guide for:
Hospitals
Nursing Facilities
Clinics

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Forward

The Office of Statewide Health Planning and Development (OSHPD) is responsible for enforcing all building standards, codes, and regulations pertaining to health care facilities in the State.

The following document was compiled by the OSHPD electrical engineering staff as a guide for plan review to verify compliance and is intended for OSHPD use. It highlights and summarizes the most common requirements encountered in the review of health care facilities. All others who use this information for any other purpose do so with the full knowledge that it may not contain every requirement or change in policy and that the requirements are as interpreted by OSHPD.

All projects submitted on or after November 1, 2002 are subject to the 2001 California Electrical Code (CEC) which is the 1999 National Electrical Code (NEC) with the 2001 California Amendments.

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Plan Review Check List The following may be used as a guide for triage to check that submitted plans are complete and reviewable by OSHPD.	
Item	Description
1	All electrical plans and specifications signed by the electrical engineer of record.
2	List of symbols and abbreviations used on plans and their meaning.
3	Correct electrical code version cited.
4	Room names and numbers on all plan sheets.
5	Single line diagram of the electrical system showing normal source and segregation of the essential electrical system. Clearly identify components as normal, critical, life safety, or equipment.
6	Site plan showing service entrance, distribution system, service transformer, and generator location.
7	Drawings showing details of all switchboards, panels, and equipment.
8	Load calculations or other approved methods showing verification of load capacity for all equipment and conductors. Show effect on both normal and emergency system.
9	Panel schedules with totalized, tabulated loads. Panel schedules shall indicate rating of panel, feeder conductor, feeder overcurrent protective device, branch/system (critical, life safety, equipment) and loads served.
10	Schedules of ratings of equipment requiring electrical connection.
11	Schedule showing all feeders phase and ground conductors, conduit sizes, estimated lengths, and overcurrent protective devices.
12	Location and power source for all wiring devices, including receptacles, lights, switches, junction boxes, power outlets, and telephone outlets.
13	Fire alarm system. Provide specifications for equipment, show location of all devices, and show connection to life safety power source. Indicate if power limited.
14	Nurse call system. Provide specifications for equipment, show location of all devices, and show connection to power source. Indicate if power limited.
15	All equipment must be listed, labeled, or certified by a Nationally Recognized Testing Laboratory including X-ray and diagnostic equipment.

Acute Care Hospital			
ELECTRICAL SYSTEM		**System Segregation Service Equipment Electrical Room**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1	Life Safety Critical Equipment	Essential electrical system shall be comprised of two (2) systems with basically three (3) branches. The emergency system contains the critical and life safety branches, while the equipment system contains the equipment branches.	CEC 517-30 (b)
2	Life Safety Critical Equipment	Minimum of three (3) transfer switches are required, at least one (1) for each branch. [One (1) transfer switch allowed for maximum demand on essential electrical system of #150kVA]	CEC 517-30 (b) (4)
3	Life Safety Critical	Branch wiring shall be independent of all other wiring and equipment except in transfer switches, exit signs, two source emergency lighting.	CEC 517-30 (c) (1) CEC 700-9 (b)
4		Essential services may originate or pass through existing facilities provided they are seismically conforming facilities.	CEC 517-4 CBC 420A.4.0
5		Load capacity verification required for all modifications to existing systems. [See Policy Intent Notice, Appendix B]	CEC 220-35
6	Critical	At least one receptacle and minimal lighting in electrical rooms.	CEC 517-33 (a) (8) (n)
7	Normal	Ground fault protection required on service main 1000 ampere or greater for LG voltage > 150V. Ground fault protection required on feeders if supplied on main. This includes upgrades of existing facilities.	CEC 230-95 & 517-17
8	Life Safety	No other function other than those listed in this Code section are allowed to be connected to the life safety branch of the emergency system.	CEC 517-32

Acute Care Hospital			
EMERGENCY POWER		**Generator** **Fuel Supply** **Alarms** **Transfer Switches**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1		Alternate source of power shall be a generator	CEC 517-35 (b)
2	Life Safety	Task illumination battery charger at generator set	CEC 517-32 (e)
3	Life Safety	Selected receptacles at generator set	CEC 517-32 (e)
4	Life Safety Critical	Automatic restoration of power within 10 seconds	CEC 517-31 & 700-12
5		Battery and charger for automatic starting	CEC 700-12 (b) (4)
6		On site fuel supply for at least 24 hours of operation at full demand	CEC 700-12 (b) (2) Ex.1
7	Equipment	Means for automatically transferring from one fuel supply to another when using dual supply. Fuel transfer pump shall be on emergency.	CEC 700-12 (b) (3)
8		Audible and visual alarms to indicate derangement, loading, battery/charger status, ground fault, etc.	CEC 700-7 NFPA 99, 3-4.1.1.15
9		Automatic transfer switches require bypass and isolation capability.	CEC 517-30 (b) (7)
10		Separately derived grounding systems require four (4) pole transfer switches.	CEC 250-20 (d) & 250-30
11		Overcurrent protection	CEC 445-4
12		Separate generator room [See CAN 2-413A.2.3 in Appendix B]	CBC 413A.2.3

Acute Care Hospital			
CONDUIT & WIRING		**Materials** **Installation**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1		Non-metallic rigid and flexible conduit are not permitted for use in patient care areas of health care facilities. [See Item No. 6 below]	CEC 331-4 (10) & CEC 347-3 (g)
2		Flexible metal conduit (FMC) is permitted for use in patient care areas with all of the following conditions: • installed with a green insulated copper ground conductor required by CEC 517-13 • the **total** length in any ground return path is less than six feet • the conduit is terminated in fittings approved for grounding • the circuit overcurrent protective device is 20A or less	CEC 517-13 (b)
3		Non-metallic sheathed cable (i.e. NM, NMC, Romex) is not permitted for use in patient areas, emergency system wiring or structures over three (3) stories	CEC 517-13 CEC 336-5 (a) (1) CEC 517-30 (c) (3)
4		Flat conductor cable (FCC) is not permitted for use in health care facilities.	CEC 328-5

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Acute Care Hospital			
CONDUIT & WIRING [Continued]		**Materials Installation**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
5		Low voltage cables for fire alarm, nurse call, communications systems, etc. installed without the use of conduit is permitted if power supplies are "power limited" type and conductor is listed for such use.	CEC 725, 760 & 800
6		All emergency system wiring shall be installed in non-flexible metallic raceway. [Schedule 40 PVC conduit is allowed for underground emergency system wiring inside or outside the building envelope, provided it is concrete encased. Schedule 80 PVC conduit is allowed without concrete encasement. Neither are allowed for branch circuits serving patient care areas.]	Code Application Notice CEC 517-30 (c) (3)
7		Separation of 24 inches (horizontal distance) for outlet boxes in fire rated wall and partitions.	CBC 709.7

Acute Care Hospital			
MISCELLANEOUS		**Identification** **Wiring Devices** **Lighting**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Life Safety Critical	All receptacles connected to the emergency system and all light switches controlling emergency lighting shall be identified in a conspicuous and permanent manner such as with red colored plates and/or red colored devices.	CEC 517-23
2	Critical	All receptacles in critical care patient areas shall be marked with panel and circuit number supplying them.	CEC 517-19 (a)
3		Identify all boxes and enclosures for emergency	CEC 700-9 (a)
4		All rooms and passage ways shall have artificial lighting with levels per the Illuminating Engineers Society (IES) Handbook. [See PIN 13 in Appendix A]	CEC 517-22 (a) & (b)
5		Lamps shall be considered protected against accidental breakage if provided as follows: • with an enclosing lens or diffuser • with louvers having a maximum cell size of 96 square inches and all parts of the fixture are at least 8'-0" above the finished floor • open bottom luminaires limited to 144 square inch opening and all parts of the fixture at least 8'-0" above the finished floor • wire guards or plastic tube guards in service areas such as electrical, equipment, & janitor	CEC 517-22 (c)

Acute Care Hospital			
MISCELLANEOUS		**Fire Pumps** **Ethylene Oxide (ETO) Sterilizers** **Mobile Medical Facilities**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Separate System	Fire pumps shall comply with all of the requirements of NFPA 20 and CEC 695. [Key points are separate service to the pump or power supply tapped ahead of the main building over current device; integrated controller, motor, and pump; separate transfer switch; short circuit calculations required; overload protection sized for locked rotor amps.]	CBC 904.1.2 NFPA 20 CEC 230-82 (4) CEC 230-90(a) Ex. 4 CEC 695
2	Equipment	ETO sterilizer exhaust shall be on emergency	CEC 517-34 (b) (3) CMC 418 CBC 423A.4.4
3	Life Safety	ETO sterilizer area exhaust required to have an audible and visual alarm system	CEC 517-32 (c) CBC 423A.4.5
4		Feeder and disconnect for mobile medical facilities	CEC 517-24

Acute Care Hospital			
GROUNDING BONDING		**Receptacles Panelboard Patient Areas Anesthetizing Areas Wet Locations**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1		Receptacles in patient areas shall be provided with a green insulated copper grounding conductor	CEC 517-13
2		Fixed equipment in patient area	CEC 517-13
3		Branch circuits, provide redundant ground path	CEC 517-13 (b)
4		Panelboard bonding and grounding	CEC 517-14 & 19 (d)
5		General care patient area receptacles Critical care patient area receptacles	CEC 517-18 (b) & (c) CEC 517-19 (b)
6		Anesthetizing area grounding	CEC 517-62
7		Generator grounding	CEC 250-20 (d) & 30
8		GFCI for receptacles and fixed equipment in wet locations	CEC 517-20 (a)
9		GFCI for receptacles in bathrooms and on roofs	CEC 210-8 (b)
10		Therapeutic pools and tubs	CEC 680 Part F
11		Receptacles and light switches in vicinity of shower stalls and bathtubs	CEC 680-62 (g) (1)
12		Isolated power systems	CEC 517-19 (f) & CEC 517-20 (b)
13		Special purpose receptacles in critical care areas	CEC 517-19 (g)
14		X-Ray equipment grounding	CEC 517-78

Acute Care Hospital			
MECHANICAL EQUIPMENT		**HVAC Sump Pumps Central Suction (medical) Chiller Rooms Mechanical Rooms**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1	Equipment	HVAC - heating and cooling required by the California Mechanical Code (CMC)	CEC 517-34 (b) (1.1) CMC Section 316
2	Equipment	HVAC - supply and exhaust fans required for positive or negative pressure	CMC 316.4 CEC 517-34 (b) (3)
3	Equipment or Critical	Delayed automatic connection for medical and surgical central suction including controls	CEC 517-34 (a) (1)
4	Equipment	Delayed automatic connection for sump pumps and other equipment required to operate for the safety of major apparatus including associated controls and alarms	CEC 517-34 (a) (2)
5	Equipment	Delayed automatic connection for medical and surgical compressed air systems including controls	CEC 517-34 (a) (3)
6	Critical	At least one receptacle and minimal lighting in mechanical rooms	CEC 517-33 (a) (8) (n)
7		Single switch for chiller rooms to shutdown system located immediately outside room. [If equipment is on emergency power the shutdown controls should be on the same system]	CMC 1109.4
8		Lighting fixture at or near equipment installed in under floor, attic or furred space	CEC 210-70 (c)
9		Service receptacle located within 25 feet of all equipment	CMC 306.3 CEC 210-63

Acute Care Hospital			
ELEVATORS		**Elevators**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1	Life Safety	Cab lighting, machine room lighting, control, communications, seismic switch, and signal systems on emergency power	CEC 517-32 (f)
2	Life Safety	Separate branch circuit for car (cab) lights for each elevator	CEC 620-22 (a)
3	Normal or Equipment	Pit lighting	CEC 620-24
4	Life Safety	Machinery Room Lighting	CEC 517-32(f) CEC 620-23
5	Equipment	Automatic or manual connection for at least one elevator	CEC 517-34 (b) (2)
6		Overcurrent protection of control wiring: #18 not over 7 amps, #16 not over 10amps Motor duty classified as intermittent	CEC 620 Part G CEC 725-23 CEC 430-33
7		Receptacle required in pits	CEC 620-24 (c)
8	Equipment	Receptacle required in machinery rooms	CEC 620-23 (c) CEC 517-33 (a) (8) (n)
9		Disconnecting devices for all power sources	CEC 620 Part F

Acute Care Hospital			
COMMUNICATIONS AND SIGNAL SYSTEMS		**Nurse Call** **Fire Alarm** **Medical Gas** **Cable TV** **Emergency Communications** **Other alarm and alerting systems**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	On branch as required	Low voltage cables for fire alarm, nurse call, communications systems, etc. installed without the use of conduit is permitted if power supplies are "power limited" type and conductor is listed for such use.	CEC 725, 760, & 800
2	Critical	Nurse call power on emergency	CEC 517-33 (a) (5)
3	Life Safety	Fire alarm power on emergency [This includes control panel, automatic fire and smoke detection devices, automatic actuators under fire alarm control, electric water flow devices.]	CEC 517-32 (c) (1)
4	Life Safety	Medical Gas alarm power	CEC 517-32 (c) (2)
5	Life Safety	Other alarm and alerting systems	CEC 517-32 (c)
6	Life Safety	Communication systems used for issuing instruction during emergency conditions	CEC 517-32 (d)

Acute Care Hospital			
NON-PATIENT AREA		**Corridors Exits Entrances**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Life Safety	Emergency power for egress illumination Minimum of 1 foot candle	CEC 517-32 (a) CBC 1003.2.9.1
2	Life Safety	Switch control for emergency egress illumination	CEC 517-32 (a) CEC 700-20
3	Life Safety	Exit signs [Batteries are not an acceptable source of alternate power]	CEC 517-32 (b) CBC 1003.2.8.4
4	Equipment	Automatically operated doors	CEC 517-34 (b) (6)

Acute Care Hospital			
NON-PATIENT AREA		**Food Preparation Area Kitchen Nourishment**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Critical	Task illumination on emergency	CEC 517-33 (a) (8) (m)
2	Critical	At least one receptacle on emergency	CEC 517-33 (a) (8) (m)
3		Appliances shall comply with Article 422	CEC 422

Acute Care Hospital			
NON-PATIENT AREA		**Clean Utility Room** **Soiled Utility Room** **Central Supply** **Blood, Bone, and Tissue Banks** **Human Physiology Laboratory** **Telephone Equipment Room**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Critical	Task illumination on emergency	CEC 517-33 (a)
2	Critical	At least one receptacle on emergency	CEC 517-33 (a)
3	Equipment	Laboratory fume hoods on emergency	CEC 517-34 (b) (3)

Acute Care Hospital			
NON-PATIENT AREA		**Nurses Station** **Medication Preparation Area** **Pharmacy**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Critical	Task illumination on emergency	CEC 517-33 (a)
2	Critical	At least one receptacle on emergency	CEC 517-33 (a)
3	Critical	Nurse call system (required at nurses station only)	CEC 517-33 & 123

Acute Care Hospital			
GENERAL CARE PATIENT AREA NON-ANESTHETIZING		**Patient Bedroom Isolation Room**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Normal or Equipment & Critical	Two (2) separate branch circuits per bed. Two (2) duplex hospital grade receptacles per bed.	CEC 517-18 (a.1) & (b)
2		Tamper resistant receptacles in pediatric locations	CEC 517-18 (c)
3	Critical	Patient nurse call station at each bed location	CEC 517-123 (a) (1) CEC 517-33 (a) (5)
4	Critical	Patient nurse call station at each toilet, bath, and shower room	CEC 517-123 (a) (2) CEC 517-33 (a) (5)
5	Equipment	HVAC	CEC 517-34 (b) (1.1)
6		Artificial lighting levels per IES handbook	CEC 517-22

Acute Care Hospital			
SPECIAL PROCEDURE GENERAL CARE PATIENT AREA NON-ANESTHETIZING		**Endoscopy** **Gamma Knife** **Lithotripsy**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1	Critical	Task illumination on emergency	CEC 517-33 (a)
2	Critical	Selected receptacles on emergency	CEC 517-33 (a) (4) & (8)
3	Critical	Staff emergency call required	CEC 517-123 (b) (1)
4	Critical	Standard clock required	CEC 517-33 (a) (8) l
5	Equipment	HVAC	CEC 517-34 (b) (1.1)
6	Critical	Patient lift on emergency (lithotripsy)	CEC 517-33 (a) (8) j
7		Provide GFI on the feeder serving wet procedure equipment. GFI on feeder not required if supplied with mobile unit. (lithotripsy)	CEC 680-62
8		GFCI type receptacles (lithotripsy)	CEC 517-20 (a)
9		Equipment to be listed, labeled, or certified by a Nationally Recognized Testing Laboratory [See CAN 3-110-2 in Appendix B]	CEC 110

Acute Care Hospital			
RADIOLOGY GENERAL CARE PATIENT AREA NON-ANESTHETIZING		**C.T. Scanner** **Mammography** **X-Ray**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1		Disconnecting means	CEC 517-72
2		Disconnecting means not required for portable equipment served by 120 volt receptacle rated 30A or less	CEC 517-72 (c)
3		Rating of supply conductor and overcurrent protective device	CEC 517-73
4		Grounding and bonding	CEC 517-13, & 78
5		Equipment to be listed, labeled, or certified by a Nationally Recognized Testing Laboratory [See CAN 3-110-2 in Appendix B]	CEC 110

Acute Care Hospital			
GENERAL CARE PATIENT AREA NON-ANESTHETIZING		**Magnetic Resonance Imaging (MRI)**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1		There are not any specialized electrical requirements for MRI rooms or systems. However, due to the strong magnetic fields associated with this equipment it is recommended that manufacturers' recommendations be followed. Below are some of the commonly encountered and OSHPD acceptable recommendations. They may differ between manufacturers. • non-ferrous conduit and lighting fixture housings • no fluorescent fixtures in MRI room • dimmers should not be used	

Acute Care Hospital			
GENERAL CARE PATIENT AREA NON-ANESTHETIZING		**Treatment Room Hemodialysis**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Critical	Task illumination on emergency	CEC 517-33 (a) (3) (f) CEC 517-33 (a) (8) (e)
2	Critical	At least one receptacle on emergency	CEC 517-33 (a) (3) (f) CEC 517-33 (a) (8) (e)

Acute Care Hospital			
PERINATAL GENERAL CARE PATIENT AREA NON-ANESTHETIZING		**Labor Room** **Birthing Room** **Alternate Birthing Center (ABC)** **Labor/Delivery/Recovery (LDR)** **Labor/Delivery/Recovery/Postpartum (LDRP)**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Normal or Equipment & Critical	Two (2) separate branch circuits per bed Two (2) duplex hospital grade receptacles per bed	CEC 517-18 (a.1) & (b)
2	Critical	Patient nurse call at each bed location	CEC 517-123 (a) (1)
3	Equipment	HVAC	CEC 517-34 (b) (1.1)
4		Lighting capability of 1076 LUX (100 footcandles) at working surfaces in LDR & LDRP	CBC 420A.42.3 (6)

LDR and LDRP are viewed electrically by OSHPD as patient bedrooms. The requirements for critical care recovery rooms and delivery rooms are not applicable.

Acute Care Hospital			
PERINATAL GENERAL CARE PATIENT AREA NON-ANESTHETIZING		**Nursery**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Critical	Task illumination	CEC 517-33 (a) (3) a
2	Critical	At least one duplex receptacle on emergency	CEC 517-33 (a) (3) a
3		One duplex receptacle shall be provided for every two bassinets	CEC 517-18 (d)
4	Critical	Staff emergency call	CEC 517-123 (b) (1)
5		Hospital grade receptacles	CEC 517-18 (b)
6	Equipment	HVAC	CEC 517-34 (b) (1.1)

Acute Care Hospital			
PERINATAL CRITICAL CARE PATIENT AREA ANESTHETIZING		**Neonatal Intensive Care Unit (NICU)**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Normal	Illumination level at 100 foot candles	CEC 517-22 (d) (2)
2		Dimmer or multi-level switching of lighting	CEC 517-22 (d) (2)
3	Critical	Task illumination	CEC 517-33 (a) (8) (h)
4		At least five (5) duplex hospital grade receptacles per bed	CEC 517-19 (b) Ex. 1
5	Normal & Critical	At least two (2) branch circuits per bed, one must be a **dedicated emergency circuit** serving only that bed location	CEC 517-19 (a)
6	Critical	Staff emergency call required	CEC 517-123 (b) (1)
7	Critical	Emergency Alarm System (Code Blue) at control desk in NICU	CEC 517-123 (c) (2)
8	Equipment	HVAC	CEC 517-34 (b) (1.1)

Acute Care Hospital			
PERINATAL CRITICAL CARE PATIENT AREA ANESTHETIZING AREA		**Delivery Room** [Delivery rooms must meet all of the requirements of operating rooms.]	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1	Normal	Battery-powered emergency lighting units.	CEC 517-63 (a)
2	Critical	Task illumination	CEC 517-33 (a) (1)
3	Critical	Surgical light	CEC 517-33 (a) (1) CBC 420A.42.1 (11)
4	Critical	Selected receptacles on emergency	CEC 517-33 (a) (1)
5	Critical	Hospital grade receptacles	CEC 517-61 (c) (2)
6	Critical	Fixed electrical equipment on emergency	CEC 517-33 (a) (1)
7	Critical	Staff emergency call required	CEC 517-123 (b) (1)
8	Critical	Standard clock with sweep second hand and elapsed timer which is direct wired or battery operated	CEC 517-33 (a) (8) (l) CBC 420A.42.1 (8)
9		Grounding and bonding	CEC 517-19 & 62
10		Wiring and equipment in non-hazardous area	CEC 517-61 (c) & 63
11	Equipment	HVAC	CEC 517-34 (b) (1.1)
12	Critical	Isolated power systems	CEC 517-160

Acute Care Hospital			
GENERAL CARE PATIENT AREA NON-ANESTHETIZING*		**Emergency Room Trauma Room**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Critical	Task illumination on emergency	CEC 517-33 (a) (8) (f)
2	Critical	At least one receptacle on emergency	CEC 517-33 (a) (8) (f)
3	Equipment	HVAC	CEC 517-34 (b) (1.1)

*In rooms where anesthetics are administered, change to “CRITICAL CARE” and follow requirements for operating rooms.

Acute Care Hospital			
CRITICAL CARE PATIENT AREA NON-ANESTHETIZING		**Recovery Room**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1	Critical	Task illumination on emergency	CEC 517-33 (a) (8) i
2		At least three (3) duplex or six (6) single hospital grade receptacles per bed	CEC 517-19 (b)
3	Normal & Critical	At least two (2) branch circuits per bed, one must be a **dedicated emergency circuit** serving only that bed location	CEC 517-19 (a)
4	Critical	Emergency Alarm System (Code Blue)	CEC 517-123 (c)
5	Critical	Patient nurse call station at each toilet, bath, and shower room	CEC 517-123 (a) (2)
6	Critical	Staff emergency call required	CEC 517-123 (b) (2)
7	Equipment	HVAC	CEC 517-34 (b) (1.1)

Acute Care Hospital			
CRITICAL CARE PATIENT AREA NON-ANESTHETIZING		**Intensive Care Unit (ICU) Coronary Care Unit (CCU)**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1	Critical	Task illumination on emergency	CEC 517-33 (a) (8) (d&h)
2		Dimmer or multi-level switching of individual bed area lighting	CEC 517-22 (d) (3)
3		At least five (5) duplex hospital grade receptacles per bed	CEC 517-19 (b) Ex. 1
4	Normal & Critical	At least two (2) branch circuits per bed, one must be a **dedicated emergency circuit** serving only that bed location	CEC 517-19 (a)
5	Critical	Standard clock with sweep second hand wall-mounted interval clock	CEC 517-33 (a) (8) (l) CBC 420A.36.18
6	Critical	Patient nurse call at each bed location	CEC 517-123 (a) (1)
7	Critical	Patient nurse call station at each toilet, bath, and shower room	CEC 517-123 (a) (2)
8	Critical	Emergency Alarm System (Code Blue)	CEC 517-123 (c) (1)
9	Critical	Staff emergency call required from control desk	CEC 517-123 (b) (2)
10	Equipment	HVAC	CEC 517-34 (b) (1.1)

Acute Care Hospital			
SPECIAL PROCEDURES CRITICAL CARE PATIENT AREA ANESTHETIZING AREA		**Angioplasty** **Angiography** **Cardiac Cath Lab** **Cytoscopy** **Laser Operating** **Operating**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Normal	Battery-powered emergency lighting units	CEC 517-63 (a)
2	Critical	Task illumination	CEC 517-33 (a) (1) & (8)
3	Critical	Surgical light	CEC 517-33 (a) (1)
4	Critical	Selected receptacles on emergency	CEC 517-33 (a) (1)
5	Critical	Hospital grade receptacles	CEC 517-61 (c) (2)
6	Critical	Fixed electrical equipment on emergency	CEC 517-33 (a) (1)
7	Critical	Staff emergency call required	CEC 517-123 (b) (1)
8	Critical	Standard clock required	CEC 517-33 (a) (8) (l) CBC 420A.15.4
9		Grounding and bonding	CEC 517-19 & 62
10		Wiring and equipment in non-hazardous area	CEC 517-61 (c) & 63
11	Equipment	HVAC	CEC 517-34 (b) (1.1)
12	Critical	Isolated power systems	CEC 517-160

Acute Psychiatric Hospital [Acute psychiatric care facilities must comply with the requirements for acute care hospitals except as modified below.]			
MODIFICATIONS AND ADDITIONAL REQUIREMENTS		**Receptacles in Patient Care Areas Emergency Generator Fuel Supply Nurse Call System**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1		Receptacles are not required in psychiatric security rooms	CEC 517-18 (b) Ex. 2
2		On site fuel supply shall be sufficient for six (6) hours of operation at full demand	CEC 700-12 (b) Ex. 2
3	Critical	Task illumination on emergency [The task is to provide night lighting, so that psychiatric patients are not in complete darkness upon loss of normal power.]	CEC 517-33 (a) (3) e
4		Nurse Call: a. Where cords are supplied they shall be detachable cords b. Patient/nurse call system not required for facilities where patients are not confined to bed.	CEC 517-123 (a) (3) CEC 517-123 Ex. 2

Nursing Facility			
ELECTRICAL SYSTEM		**System Segregation Service Equipment Electrical and Mechanical Rooms**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1	Life Safety Critical	Essential electrical system shall be comprised of two (2) separate branches, critical and life safety.	CEC 517-41 (a)
2	Life Safety Critical	Minimum of two (2) transfer switches are required, at least one (1) for each branch. [One (1) transfer switch allowed for maximum demand on essential electrical system #150kVA]	CEC 517-41 (b)
3	Life Safety	Independent of all other wiring and equipment except in transfer switches, exit signs, two source emergency lighting.	CEC 517-41 (d) CEC 700-9 (b)
4		Essential services may originate or pass through existing facilities provided they are seismically conforming facilities.	CEC 517-4 CBC 420A.4.0
5		Load capacity verification required for all modifications to existing systems. [See Policy Intent Notice 3-220 REV, Appendix A]	CEC 220
6	Normal	Ground fault protection required on service main 1000 ampere or greater for LG voltage > 150V. Ground fault protection required on feeders if supplied on main.	CEC 230-95 & 517-17
7	Life Safety	No other function other than those listed in this Code section are allowed to be connected to the life safety branch of the emergency system.	CEC 517-42
8	Critical	Task lighting and at least one receptacle in electrical and mechanical rooms	CEC 517-43 (a) (6)

Nursing Facility			
EMERGENCY POWER		**Generator Fuel Supply Alarms Transfer Switches**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1		Alternate source of power shall be a generator	CEC 517-44 (b.1)
2	Life Safety	Task illumination at generator set	CEC 517-42 (f)
3	Life Safety	Selected receptacles at generator set	CEC 517-42 (f)
4		Automatic restoration of power within 10 seconds	CEC 517-42 & 700-12
5		Battery and charger for automatic starting	CEC 700-12 (b) (4)
6		Onsite fuel supply for at least six (6) hours of operation at full demand	CEC 700-12 (b) (2)Ex. 2
7	Critical	Means for automatically transferring from one fuel supply to another when using dual supply. Fuel transfer pump shall be on emergency.	CEC 700-12 (b) (3)
8		Audible and visual alarms to indicate derangement, loading, battery/charger status, ground fault.	CEC 700-7
9		Separately derived grounding systems require four (4) pole transfer switches.	CEC 250-30 & 250-20 (d)
10		NOTE: Automatic transfer switches do not require by pass and isolation	
11		Overcurrent protection	CEC 445-4
12		Separate generator room [See CAN 2-413A.2.3 in Appendix B]	CBC 413A.2.3

Nursing Facility			
CONDUIT & WIRING		**Material** **Installation**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1		Non-metallic rigid and flexible conduits are not permitted for use in patient care areas of health care facilities.	CEC 331-4 (10) & CEC 347-3 (g)
2		Flexible metal conduit (FMC) is permitted for use in patient care areas with all of the following conditions: • installed with a green insulated copper ground conductor required by CEC 517-13 • the **total** length in any ground return path is less than six feet • the conduit is terminated in fittings approved for grounding • the circuit overcurrent protective device is 20A or less	Code Application Notice CEC 517-13 (b)
3		Non-metallic sheathed cable (i.e. NM, NMC, Romex) is not permitted for use in patient care areas or in structures over three (3) stories	CEC 517-13 CEC 336-5 (a) (1)
4		Flat conductor cable (FCC) is not permitted for use in health care facilities.	CEC 328-5
5		Low voltage cables for fire alarm, nurse call, communications systems, etc. installed without the use of conduit is permitted if power supplies are "power limited" type and conductor is listed for such use.	CEC 725, 760, 800
6		Separation of 24 inches (horizontal distance) for outlet boxes in fire rated wall and partitions.	CBC 709.7

Nursing Facility			
MISCELLANEOUS		**Identification** **Wiring Devices** **Lighting**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1	Life Safety Critical	All receptacles connected to the emergency system and all light switches controlling emergency lighting shall be identified in a conspicuous and permanent manner such as with red colored plates and/or red colored devices.	CEC 517-23
2		Identify all boxes and enclosures for emergency	CEC 700-9 (a)
3		All rooms and passage ways shall have artificial lighting with levels per the Illuminating Engineers Society (IES Handbook [See PIN 13 in Appendix A]	CEC 517-22 (a) & (b)
4		Lamps shall be considered protected against accidental breakage if provided as follows: ● with an enclosing lens or diffuser ● with louvers having a maximum cell size of 96 square inches and all parts of the fixture are at least 8'-0" above the finished floor ● open bottom luminaires limited to 144 square inch opening and all parts of the fixture at least 8'-0" above the finished floor ● wire guards or plastic tube guards in service areas such as electrical, equipment, & janitor	CEC 517-22 (c)

Nursing Facility			
GROUNDING BONDING		**Receptacles Panelboard Patient Areas Wet Locations**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1		Receptacles in patient areas shall be provided with a green insulated copper grounding conductor	CEC 517-13(a)
2		Fixed equipment in patient area	CEC 517-13(a)
3		Branch circuits, provide redundant ground path	CEC 517-13 (b)
4		Panelboard bonding and grounding	CEC 517-14 & 19 (d)
5		Patient bed location receptacles	CEC 517-18 (b) & (c)
6		Generator grounding	CEC 250-20 (d) & 30
7		GFCI required in wet locations	CEC 517-20 (a)
8		GFCI for receptacles in bathrooms and on roofs	CEC 210-8 (b)
9		Therapeutic pools and tubs	CEC 680 Part F
10		Receptacles and light switches in vicinity of shower stalls & bathtubs	CEC 680-62 (g) (1)

Nursing Facility			
MECHANICAL EQUIPMENT		**HVAC Sump Pumps Central Suction (medical) Chiller Rooms Mechanical Rooms**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1	Critical	Delayed automatic or manual connection for HVAC - heating and cooling required by the California Mechanical Code (CMC)	CEC 517-43 (b) (1.1) CMC Section 316
2	Critical	HVAC - supply and exhaust fans required for positive or negative pressure	CMC 316.4 CEC 517-43 (b) (1.1)
3	Critical	Delayed automatic connection for sump pumps and other equipment required to operate for the safety of major apparatus including associated controls and alarms	CEC 517-43 (a) (2)
4		Single switch for chiller rooms to shutdown system located outside room within 10 feet of the door	CMC 1108.5
5		Service receptacles located within 25 feet of all HVAC equipment located on roof tops, attics, and crawl spaces	CEC 210-63
6		Lighting fixture at or near equipment installed in under floor, attic or furred space	CEC 210-70 (c)
7	Critical	At least one receptacle and minimal lighting in mechanical rooms	CEC 517-43 (a) (6)

Nursing Facility			
ELEVATORS		**Elevators**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1	Life Safety	Cab lighting, control, communications and signal systems on emergency power	CEC 517-42 (g)
2	Life Safety	Separate branch circuit for car (cab) lights receptacle(s), auxiliary power lighting source, and ventilation for each elevator car	CEC 620-22 (a)
3	Critical	Delayed automatic or manual connection to emergency power for all elevators to allow the release of passengers	CEC 517-43 (b) (2)
4		Overcurrent protection of control wiring: #18 not over 7 amps, #16 not over 10 amps Motor duty classified as intermittent	CEC 620 Part G CEC 725-23 CEC 430-33
5		Receptacle required in pits	CEC 620-24 (c)
6	Critical	Task lighting and receptacles required in machinery rooms	CEC 620-23 (c) CEC 517-43 (a) (6)
7		Disconnecting devices for all power sources	CEC 620 Part F

Nursing Facility			
COMMUNICATIONS AND SIGNAL SYSTEMS		**Nurse Call** **Fire Alarm** **Medical Gas** **Cable TV** **Emergency Communications** **Other alarm and alerting systems**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1	On Branch as required	Low voltage cables for fire alarm, nurse call, communications systems, etc. installed without the use of conduit is permitted if power supplies are "power limited" type and conductor is listed for such use.	CEC 725, 760, & 800
2	Life Safety	Nurse call power on emergency	CEC 517-42 (c) (3)
3	Life Safety	Fire alarm power on emergency [This includes control panel, automatic fire and smoke detection devices, automatic actuators under fire alarm control, electric water flow devices]	CEC 517-42 (c) (1)
4	Life Safety	Medical gas alarm power	CEC 517-42 (c) (2)
5	Life Safety	Other alarm and alerting systems	CEC 517-42 (c)
6	Life Safety	Communication systems used for issuing instruction during emergency conditions	CEC 517-42 (d)

Nursing Facility			
PATIENT AREA		**Corridors Exits Entrances Dining and Recreation Areas**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Life Safety	Emergency power for egress illumination Minimum at 1 foot candle	CEC 517-42 (a) CBC 1003.2.9.1
2	Life Safety	Emergency power for egress illumination in dining and recreation areas	CEC 517-42 (e)
3	Life Safety	Switch control for emergency egress illumination	CEC 517-42 (a) CEC 700-20
4	Life Safety	Exit signs	CEC 517-42 (b) CBC 1003.2.8.4
5	Critical	Selected receptacles in patient room corridors so that any patient bed can be reached with a fifty foot extension cord [Not required if each bed location served by receptacles complying with CEC 517-18 (a) & (b)]	CEC 517-43 (a) (5)

Nursing Facility			
NON-PATIENT AREA		**Food Preparation Area Kitchen Nourishment**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1		Appliances shall comply with Article 422	CEC 422

Nursing Facility			
NON-PATIENT AREA		**Nurses Station** **Medication Preparation Area** **Pharmacy Dispensing Area**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1	Critical	Task illumination	CEC 517-43 (a) (1)
2	Critical	At least one receptacle on emergency	CEC 517-43 (a) (1)
3	Life Safety	Nurse call system (required at nurses station only)	CEC 517-42 (c) (3) CEC 517-123

Nursing Facility			
GENERAL CARE PATIENT AREA		**Patient Bedroom**	
NO.	BRANCH	REQUIREMENTS	APPLICABLE CODES
1	Life Safety	Patient nurse call station at each bed location	CEC 517-123 (a) (1) CEC 517-42 (c) (3)
2	Life Safety	Patient nurse call station at each toilet, bath, and shower room	CEC 517-123 (a) (2) CEC 517-42 (c) (3)
3	Critical	HVAC	CEC 517-43 (b) (1.1)
4		Artificial lighting levels per IES handbook	CEC 517-22
5		Two duplex receptacles per bed [Hospital grade not required]	CEC 517-18 (b)

Clinics			
		Ambulatory Surgical Clinic **Outpatient Surgical Clinic** **Hemodialysis Clinic**	
NO.	**BRANCH**	REQUIREMENTS	APPLICABLE CODES
1		Grounding in patient care areas: Provide a green insulated copper ground conductor to all receptacles. All branch circuits shall be installed in metal conduit suitable for redundant ground return path.	CEC 517-13
2		Hemodialysis clinic shall have egress lighting and exit signs with at least 1½ hour battery backup.	CEC 517-50 (e)
3		Surgical clinics shall have emergency power supplied by a generator with at least 4 hours of on site fuel.	CEC 517-50 (c) (1) Ex. 2 CEC 700-12 (b) (2) Ex. 3
4		Surgical clinics shall have the following on emergency power: a. egress lighting b. exit signs c. alarm and alerting systems d. nurse call system e. central suction system f. task illumination and selected receptacles for operating rooms recovery rooms nurses station mechanical and electrical rooms telephone equipment rooms	CEC 517-50 (d)

Appendix A

Policy Intent Notices (PIN)
Available: www.oshpd.state.ca.us

File No.	Revision	Subject
PIN 13	11/1/01	Lighting System Retrofits
3-220	01/14/99	Electrical Load Capacity Verification Guideline

Appendix B

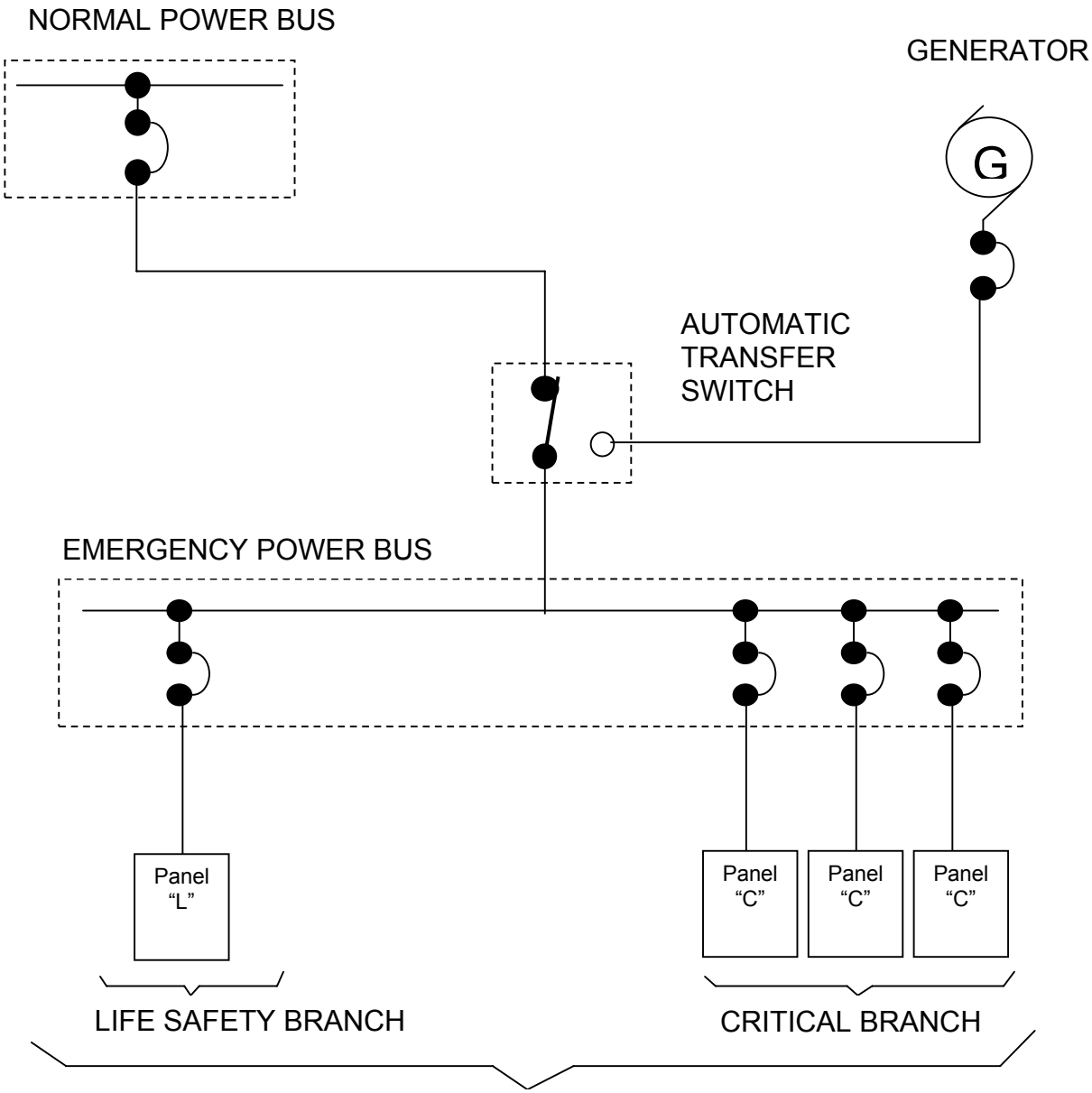
Code Application Notices (CAN)
Available: www.oshpd.state.ca.us

File No.	Revision	Subject
2-413A.2.3	03/20/01	Combustion Engines and Gas Turbines
3-110-2	05/31/01	Approvable Equipment

Appendix C

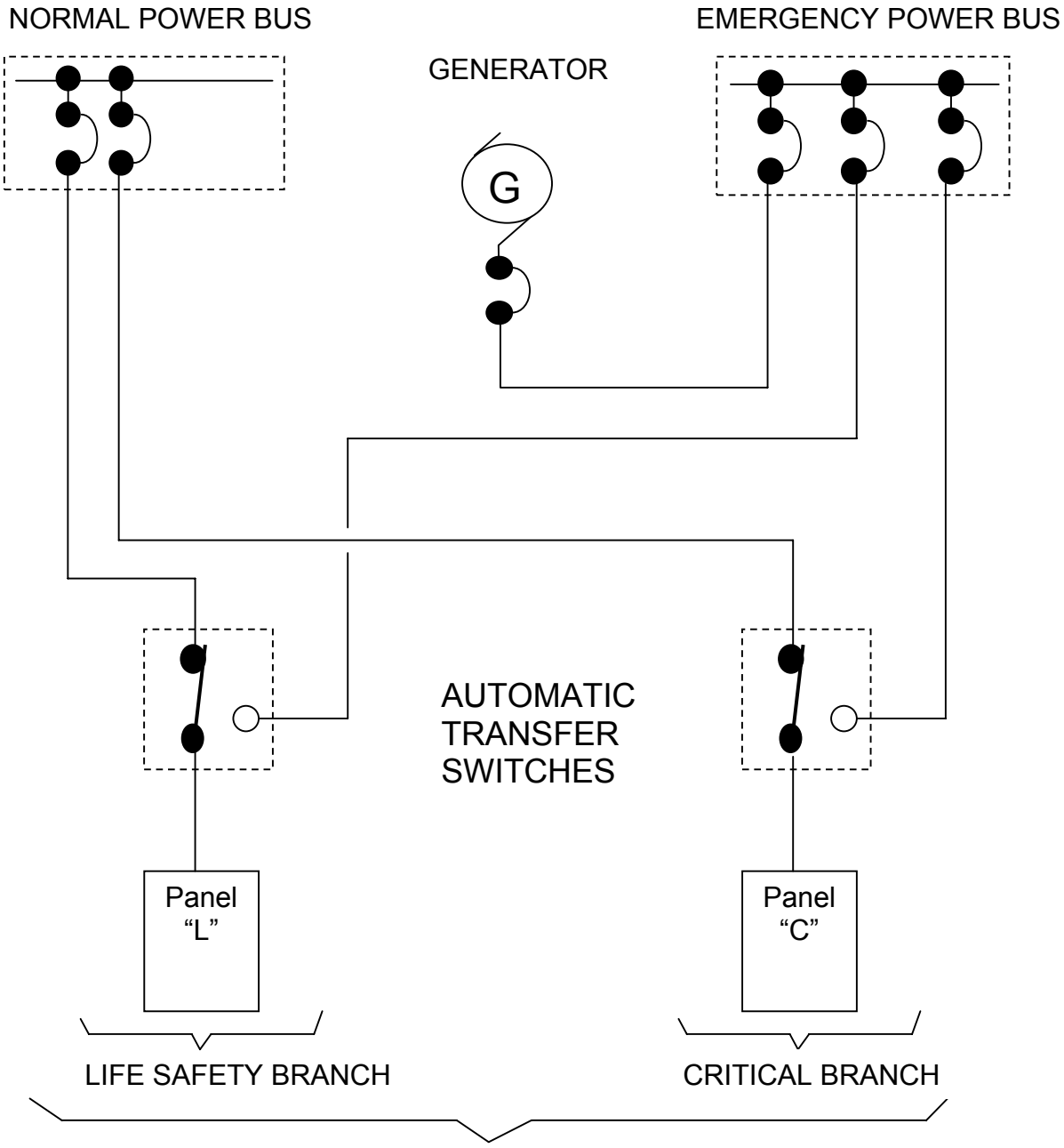
Standard Details

Drawing No.	Revision	Subject
E-0002-01	08/22/96	Electrical System (Small Nursing Home)
E-0002-02	08/22/96	Electrical System (Large Nursing Home)
E-0003-01	08/21/96	Electrical System (Small Hospital)
E-0003-02	08/21/96	Electrical System (Large Hospital)



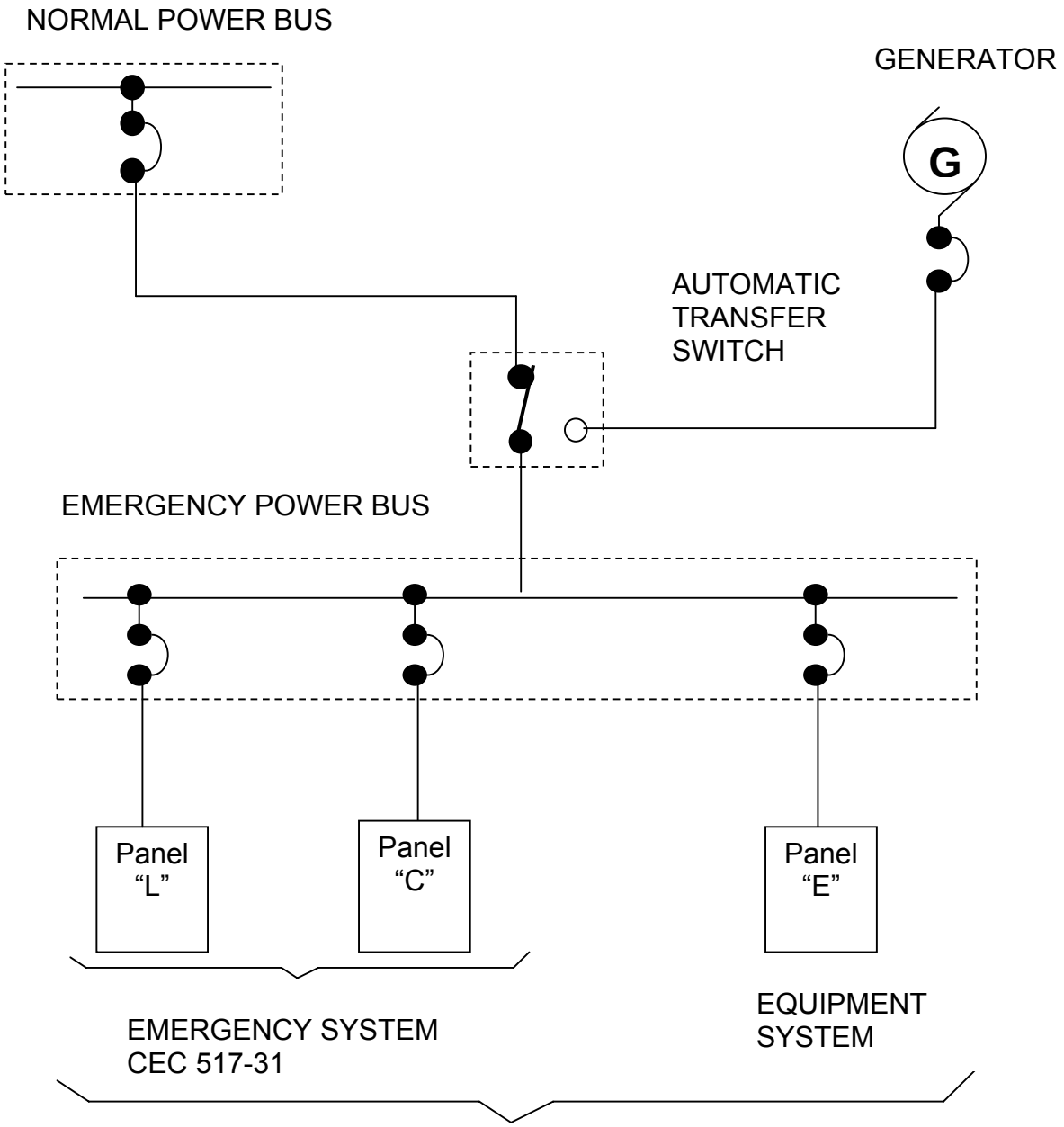
"L" LIFE SAFETY BRANCH CIRCUITS CEC 517-42
"C" CRITICAL BRANCH CIRCUITS CEC 517-43

OSHPD STANDARD DETAILS	Description MINIMUM ELECTRICAL SYSTEM TYPICAL SMALL NURSING HOME 150 kVA MAXIMUM DEMAND ON ESSENTIAL ELECTRICAL SYSTEM	Scale NONE	Detail E0002-01
		Drawn JJG	Date 3/17/98



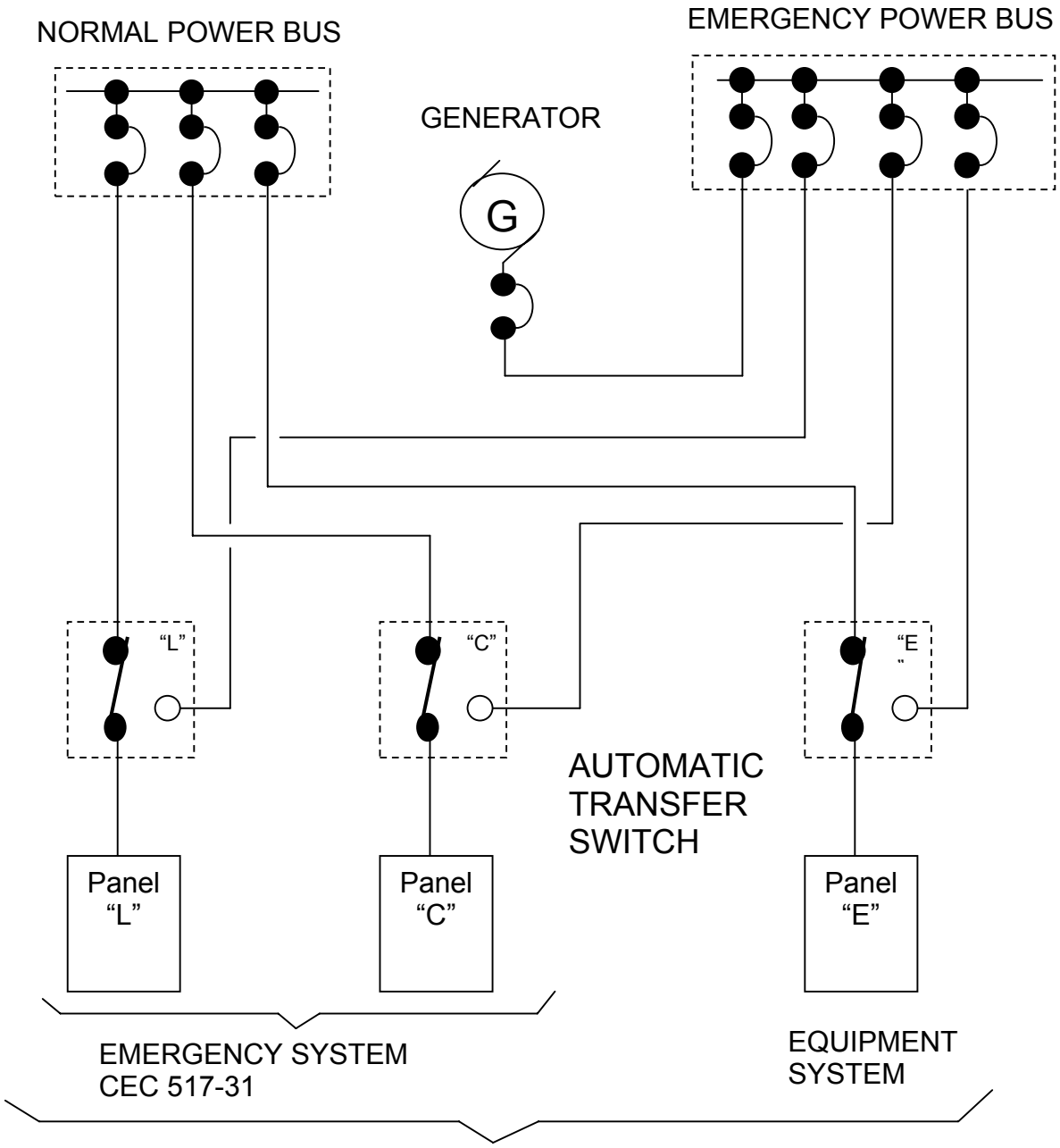
"L" LIFE SAFETY BRANCH CIRCUITS CEC 517-42
"C" CRITICAL BRANCH CIRCUITS CEC 517-43

OSHPD STANDARD DETAILS	Description MINIMUM ELECTRICAL SYSTEM TYPICAL LARGE NURSING HOME GREATER THAN 150 kVA MAXIMUM DEMAND ON ESSENTIAL ELECTRICAL SYSTEM	Scale NONE	Detail E0002-02
		Drawn JJG	Date 8/22/96



"L" LIFE SAFETY BRANCH CIRCUITS CEC 517-32
"C" CRITICAL BRANCH CIRCUITS CEC 517-33
"E" EQUIPMENT BRANCH CIRCUITS CEC 517-34

OSHPD STANDARD DETAILS	Description MINIMUM ELECTRICAL SYSTEM TYPICAL SMALL HOSPITAL 150 kVA MAXIMUM DEMAND ON ESSENTIAL ELECTRICAL SYSTEM	Scale NONE	Detail E0003-01
		Drawn JJG	Date 8/21/96



ESSENTIAL ELECTRICAL SYSTEM (CEC 517-30)

"L" LIFE SAFETY BRANCH CIRCUITS CEC 517-32
"C" CRITICAL BRANCH CIRCUITS CEC 517-33
"E" EQUIPMENT BRANCH CIRCUITS CEC 517-34

OSHPD STANDARD DETAILS	Description MINIMUM ELECTRICAL SYSTEM TYPICAL LARGE HOSPITAL – GREATER THAN 150 kVA MAXIMUM DEMAND ON ESSENTIAL ELECTRICAL SYSTEM	Scale NONE	Detail E0003-02
		Drawn JJG	Date 8/21/96

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